a portion (and it may be a diminutive quantity) locally detached from the main stream, or a feeder dropping into the main stream from steep, rocky sides. This is the primary cause. But along with the presence of a graving machine in the falling waters, to explain the making of the fonts a concurrent cause is necessary, as otherwise they should be looked for anywhere and everywhere on rapid descents. The conducive condition is the coincidence of falling waters with a *weakness* of the rock, such as an intersection of the division planes or fissures. I have secured a specimen font, 10 inches deep and 12 inches width across the bell-shaped mouth, in compact siliceous rock graven by a diminutive shoot of the main stream running down the depression which generally marks the edge of a division plane till it reached an intersection; at the intersection it graved a font, and issuing from this went on to the next, and there graved another (see sketch, Fig. 1). The stream, flowing round and kept up by a bed of rock dipping approximately in the direction of the current, overflows in flood-time, or generally except in dry summer weather, down the fissure A B; at the intersections the fonts were graven, and the water on leaving the lower one runs along the edge of a superposed bed. We are now bound to seek a limiting condition, as otherwise almost every pool into which there is a waterfall might reasonably be expected to be a font. The limiting cause is the relation between the size of the blocks into which the rock is divided and the graving power of the falling waters. If the waterfall is sufficient to grave a font of over a certain size in rocks broken by planes into blocks of a certain size, the consequence is that the whole blocks or blocks by fragments will be broken away, and the walls will be the divisional planes of the rock and lose altogether the font shape, as is wholly or partially the case under our larger waterfalls owing to the "pigmy plan" on which our (Slievardagh) rocks are broken up by planes. Fig. 2 will explain the meaning I wish to convey. Suppose the rocks broken by two sets of planes, and there may be many sets and the stratification as well; now suppose a font graven to the size of the circle; it is plain that this could not have stability, as the blocks at A, B, C, D would have come away during the process. But had the font been so small as to take only a portion of any four blocks no discontinuance of the graving action could yet have occurred.

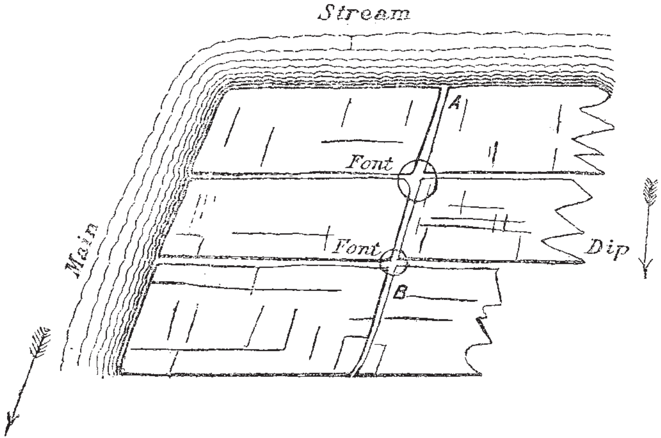

Fig. 1

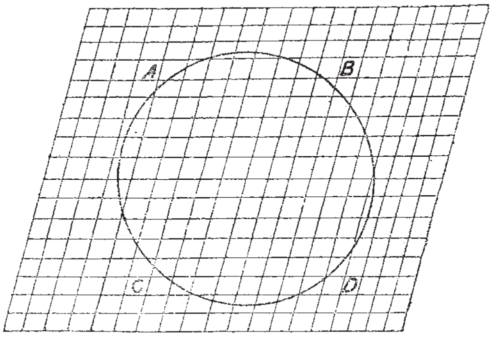

Fig. 2

I may add that about 2 feet in width and depth is the size of the largest font I have come upon hitherto.

William Morris

Earlshill Colliery, Thurles

The Good Time Begun

The following has just been received from a nephew in the Bombay Presidency, who, after speaking generally of a tremendous gale from the south-west, with heavy sea, fog, &c., all along the West Coast, writes thus more particularly:—

"That same mist and rain have been for the present the saving of this Presidency from another famine. It (the rain) has been general and heavy all over the country, and was just in time to save the crops, which were fast perishing from lack of moisture. If we have a little more this month and another good fall in September, we shall be quite safe; and I do trust we shall not be disappointed, as another year—the fourth in succession—of scarcity would well nigh make 'the bankruptcy of India,' so far as Bombay is concerned, a sad fact."

You will note the appearance of this desiderated Indian rain coming from the same direction as the chief part of that which has been deluging our own country; but which Mr. Campbell shrewdly attributed, in Nature, vol. xx. p. 403, to the sun recovering his forces and beginning already to shine, after his recent languid, spotless years, with increased radiation on the great oceans of the south.

Piazzi Smyth

15, Royal Terrace, Edinburgh, August 30

Insect-Swarms

In answer to Mr. Hawkshaw's question whether any one had seen a flight of moths and butterflies in England similar to the one he observed at Trouville on August 12 and 13, I can say that on August 12 I was walking on the Dawlish Warren (a bar of sand stretching across the mouth of the Exe) and noticed a great number of *P. gamma* moths; they were close to the edge of the water; many of them were dead, and the sand hoppers were eating them, but many more were alive and trying to flutter inland, but seemed too weak to do so. I picked up some and carried them to some wild thyme and they began to feed at once. Some of the moths were in good condition but others very much battered. The wind was blowing freshly from the sea at the time. The moths swarmed in the hedges all the way from our house to the Warren, a distance of four miles, especially on the bramble flowers. There were a great many *V. cardui* with the moths in the hedges, but none on the beach. A few days afterwards I had a letter from my brother at Dieppe saying there had been a swarm of moths and butterflies there, especially mentioning *P. gamma* and *V. cardui*, but there were also skippers and clouded whites. They swarmed about the town and country and were lying dead on the beach. The swarm of moths and butterflies was also on August 12.

Edith Pycroft

Kenton, near Exeter, August 31

Earthquake in Dominica

A severe shock of earthquake was felt here at 1.20 A.M. yesterday (Sunday) the 10th instant, and at intervals, until 1.52, there were several tremulous movements of the earth. The noise immediately preceding the first shock reminded me of the clatter which is sometimes heard on board an ocean-going steamer in very rough weather, when a heavy sea strikes the ship, and all the crockery laid out for dinner is suddenly thrown from the "fiddles" and broken into pieces on the floor of the saloon.

After the first shock there was an interval of perfect quiet until 1.30, when subterranean noises like the discharging or booming of distant guns attracted my attention, and then, at

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intervals varying from two to five minutes' duration, I counted six of these discharges, and following each discharge there came a gentle tremulous movement. Immediately after the last movement, heavy rain fell, and at 1.55 there were several flashes of very vivid lightning accompanied by loud peals of thunder. The rain continued to fall during all yesterday and last night.

Although Dominica is essentially of volcanic origin, and contains at the present day three active geysers, called respectively the Souffrière, the Walton Waven, and the Boiling Lake, no unusual quantity of sulphurous or mephitic vapours have lately been noticeable in the atmosphere; in fact, only one of the phenomena usually attending earthquakes preceded the shocks I have just described, and that was violent rain. The planters' "dry season" may be said to begin in January and to end in July, and during these months, harvesting, *i.e.*, sugar-making, goes on uninterruptedly. This year, however, there has been no "dry season," for 101·67 inches of rain have fallen on the east coast and 45·80 on the west coast of this island.

I may add, in conclusion, that being unwell and unable to sleep, I was reading by lamplight when the shocks above described took place, and that I timed them carefully with a chronometer-watch by Barraud and Lund, which was on a chair near my bed.

EDMUND WATT
Resident District Magistrate,
Leeward Islands

Dominica, British West Indies, August 11

Is it True that no Animal can be shown to have made Use of Antecedent Experience to intentionally improve upon the Past?

I HAD a pair of yellow African singing finches last year. The hen laid twenty-two eggs during the year, three at each nesting. In early spring I gave her materials to build with. She selected cotton wool and fine dryish grass for her purpose. It was very cold weather when she built her first nest in a little basket which I fixed high up in her cage.

The nest was a mere film of cotton wool lined with a few blades of grass. Of course the little creature could not sufficiently warm her eggs to hatch them, if they had proved fertile, which they did not.

At the end of fourteen days the cock, finding the eggs unhatched, set to work to bury them under cotton and grass (he being the only cock bird I had ever kept that built quite as well and as diligently as the hen did).

I then removed the eggs and the nest, and gave the birds fresh materials to build another nest with. They very soon accomplished this, making the nest of the same materials, *but thicker and more compact than the last.*

Again three white eggs were laid in it, but the hen could not get up the necessary degree of heat to hatch them, and at the end of fourteen days the cock set to work to build a third nest over them as before.

I again took away the nest and eggs, and I replaced the basket, this time covered externally with wadding and flannel, in hopes that thus I might help the hen to get up the proper temperature.

The little creatures immediately set to work to build again, but they this time built *a much thicker and warmer and more compact nest* than they had ever done before. The eggs proved fertile, and the process of incubation seemed to be successfully drawing to a close; but the patience of the cock did not suffice for the occasion. At the end of the tenth day he set to work to pull the cotton wool and grass about from the edges of the nest, and tried to bury the eggs as before, urging the hen to begin again also. This showed an unaccountable lack of instinct, not to say of reason; but surely the fact that the birds built each succeeding nest more and more thickly and warmly till incubation was possible indicates that they had made use of antecedent experience, and intentionally improved upon the past. These birds built a warm nest this spring, and succeeded in hatching a young one.

J. E. S.

Deltaic Growths

IN NATURE, vol. xix. p. 506, a Rangoon correspondent states that the Gulf of Martaban has shallowed 100 feet since the surveys of Captains Ross and Crawford, made probably thirty years ago. He is mistaken as to the date of these surveys for this reason:—

In 1822, at the outbreak of the first Burmese war, my father was appointed Flag Captain to Commodore Sir John Hayes's squadron, and he subsequently received the thanks of the Indian Government for, among other services, his surveys and explorations of the enemy's coasts and rivers. Now the soundings in the gulf would be about the first made. Hence the date would be 1822, or fifty-seven years ago. This shows an average annual deposit of 1·8 foot, which, although very much less than what Mr. Doyle imagines, is yet almost incredible. May there not have been a gradual rising of the sea bottom to assist?

FRASER S. CRAWFORD

Adelaide, South Australia, July 16

Sphinx (Deilephila) Lineata

As this insect is "unquestionably rare in England," and not common anywhere ("*D. Daucus*, a native of North America, being placed for it"—according to Mr. Stephens—"in collections"), perhaps I may be allowed to mention that a beautiful and perfect specimen of it was secured in my garden, on the 15th inst., by my little son, William Cecil. He was attracted to its resting-place in a wigelia bush by the flight there of a common gamma, and to his credit, inclosed it gently in his hand without the slightest injury—a prize indeed for a collector eight years old!

A specimen was also sent my daughter some months ago, from Porto Fino on the Riviera di Levante, by Mr. Robert Macdonald, but it was unfortunately wrecked in the post.

Bregner, Bournemouth, August 18 HENRY CECIL

The Recent Hail-storm

I INCLOSE a tracing of a broken window-pane—one of the numerous cases of damage caused by the hail-storm on the morning of the 3rd inst. in this place. I almost fear the subject is one unworthy the attention of your readers, but I am curious to know what relation the space cut out may bear to the size of the hailstone causing it; and whether the clean and regular opening made would indicate an almost horizontal direction of the blow, as in the case of a bullet.

Observations of the extreme dimensions of the hailstones on that occasion are various among my neighbours, but one so large as 3½ inches seems incredible; and that one approaching such a size should strike a window at a right angle appears also improbable.

CHAS. FREDK. WHITE

42, Windsor Road, Ealing, August 20

OUR ASTRONOMICAL COLUMN

THE WASHINGTON CATALOGUE.—A second edition, as it is termed, of this extensive and useful work has been published, and will be found to be an even more important aid to the practical astronomer than the former one, which appeared as an appendix to the Washington volume for 1871, and to which reference has been made in this column as the "Washington General Catalogue." Like the first edition, it was prepared for publication by the late Prof. Yarnall, who died suddenly after a few hours' illness on February 27, having been an astronomer at the United States Naval Observatory for twenty-six years. In a note prefixed to this second edition, Admiral Rodgers, the present superintendent of the Observatory, handsomely acknowledges the extent and value of Prof. Yarnall's labours. A large majority of the observations upon which the catalogue is founded were made by him, as well as the computations, and the first printing of the work was executed under his immediate direction. It is stated that "the completed volume only reached him when he was already unconscious—an hour before his death. Astronomers will recognise in this volume not only a work of exceeding usefulness to them, but also a fitting memorial coming at the close of the long professional life of its author."

As was explained in the introduction to the former edition, the stars forming the catalogue consist mainly of stars used in observations with the zenith telescope, in the U.S. Army Surveys, in the lists of the Coast Survey, and many of Lacaille's stars mostly observed by Lacaille only. But there is a great addition of small stars, the

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